

THE MAGNETIC FIELD OF MARS AND ITS INTERACTION WITH THE SOLAR WIND

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The outermost layers of the Martian atmosphere are thought to be scientifically unique due to the large influences exerted by the highly dynamic lower atmosphere and the direct input of the solar wind from above. The nature of the solar wind interaction with the upper atmosphere is of particular interest because Mars lacks a global magnetic field, but is well shielded over some regions by strong crustal magnetic fields. Under such circumstances, the direct impact of solar wind plasma may have resulted in enhanced loss of volatiles over the ages including the components of water. The history of upper atmosphere and solar wind interaction measurements at Mars will be reviewed, recent results from the Mars Global Surveyor and Mars Express summarized, and prospects for new scientific advances enabled by the measurements that will be made by planned orbiter and penetrator missions. Special attention will be given to planetary magnetic field measurements, the measurement of ionospheric currents driven by the solar wind, and the role of space weather modeling and forecasting in the future of Mars exploration.